The Emergence of Bamboo Building Materials in the 21st Century.

By

Avery Chua
dasso USA
Houtan Park is a regenerative living landscape on Shanghai's Huangpu riverfront. The park's constructed wetland, ecological flood control, reclaimed industrial structures and materials, and urban agriculture are integral components of an overall restorative design strategy to treat polluted river water and recover the degraded waterfront in an aesthetically pleasing way.

Shanghai World Expo Houtan Park – 2010

Yu Kongjian of Turenscape
Xilai Old Town in Chengdu China – 2011

Completed in 2011, 80,000 sq.ft of bamboo products has been used.

Liu Jiakun
of Jiakun Architects
Arabian Gulf's latest man-made island; to create a world class 5+ star resort bringing an exclusive island feel to the ever expanding urban environment of Doha; With architecture inspired Tropical resorts teamed with local vernacular, the myriad of facilities are housed along the entire length of the island. 200,000 sq.ft of exterior bamboo decking are installed at balcony, around the swimming pool and boardwalk on the beach in 2012.

Dan Bube of Design Bube Co., Ltd
“World-class” public waterfront space – built in 2014 for Youth Olympic Games

“High Performance Park” for densely populated with activity and experiences, day and night.

300,000 sq.ft of bamboo decking has been installed in 2014.

Nanjing Youth Olympic Park and Plaza 2014

Scott Slaney
of SWA Group Shanghai office
On this specific project, a section of the walkway is submerged under water for several weeks annually during the raining season.

Photo taken after 4 years (left)
Haleston Row, USA - 2016

The project is located in historical downtown Charleston. It is a row of 6 apartment installed with rooftop decking and RainClad Siding made from used Bamboo for Exterior Use. It was completed in 2016 as the very first bamboo material that achieve Class A Fire rating.

Julia Martin
of Julia F. Martin Architects
Haleston Row, USA
On the south elevation, they design rotatable sunlight adjustor made of exterior bamboo fences which can be used both sun-shading and controlling density of interior light. 200,000 sq.ft of exterior bamboo are intensively used on the building, which can generate environmentally friendly, natural and warm feeling for the users. They can be conserving energy, cost effective and having good and long-lasting qualities. The building is completed in 2016.
The world's longest sea-based project, connecting Great Bay, length 55KM, two artificial islands, 6.7 KM undersea tunnel, 22.9 KM main bridge, 8 years of construction time, 300,000 sq.ft of exterior bamboo decking are used.

Chinese president Xi Jinping announced the official opening of the HZMB at a special ceremony in Zhuhai on 23rd Oct., the bridge officially opened to traffic at 9am on 24th Oct. 2018. It is renowned “seven wonders in the modern world”.
Metro Nashville Police Administrative Headquarters - 2018

Metro Headquarters: Four-story, 114,255 sf building; Family Justice Center: Three-story, 66,210 sf building

Once complete, the facilities will be LEED Silver certified

23,000 sq.ft of dassoXTR installed Soffit is making them more environmentally friendly and energy efficient
The world's biggest bamboo interior space
total of 230,000 m² (2.3 million sq.ft) of bamboo ceiling strips
made to specification, highest fire retardant standard – M1 for public
Madrid Barajas Airport, Spain

This project was awarded:

The Best Engineering Project 2005, 3rd Prize by Spanish Engineering Institute

The 11th RIBA Stirling Prize 2006 awarded by Royal Institute of British Architects
Madrid Barajas Airport, Spain

The International Architecture Awards 2007

The Best International Terminal 2013, 3rd Place by World Airport Awards
The project uses bamboo in the interior as well as exterior of the Opera Theater. This is a 1st in the theater construction where bamboo replaces all wood material to give a natural look and feel.
Building components such as the performance stage, the acoustic wall, the seats as well as the walkway surrounding the lake front are made from bamboo.
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Shandong Grand Theatre

Shandong theatre is consisting of three hall, Opera Hall, Music Hall, and Performance Hall. The curved forms of lobbies and sky lobbies treatment with micro-perforated bamboo panels mounted in front of black absorbing finish, with high grade of fireproofing and sound absorption.
The project is an office building that is elevated 15 meter (50 feet) above lush tropical landscape. A total space of 130,000 m2 (1.29 million Sq.ft) with all the office fixtures made from bamboo (interior and exterior design).
dasso.Furnishings
Furniture, bamboo, cutting boards
dasso.Elements
Bamboo Veneers, Plywoods, and Countertops
Production of bamboo veneer
Toyota Showroom, Netherlands
Professor Jim Platts from University of Cambridge

英国剑桥大学Jim Platts教授
Professor Jim Platts from University of Cambridge
Installation of 800KW bamboo wind turbine blades
Installation of 800KW bamboo wind turbine blades
竹风力发电叶片（河北张北）
Why?
Why?
Why?
Why?
At current rate of deforestation, our rainforest could only last slightly over a life time. Up to 28,000 species will extinct in the next 25 years due to deforestation.
The main contributing factor to global warming/climate change is the release of CO2 to the atmosphere.

Your choice of materials affect the outcome - concrete.
Every year, more than 6 million tons of garbage are dumped into the ocean. Most of it is non bio-degradable. By 2050, there will be 12 billion metric tons of plastic in landfills.
The Many Faces of Moso Bamboo
Bamboo has the following properties that makes it a great building material:

- Low density: 400 to 800 kg/m3, so it is lightweight
- Resilience: Elastic and very resistant
- High Wear Resistance
- High Wettability (it could be stained or painted evenly)
- Coherent appearance and evenly distributed stress
- Dimensionally Stable (less shrinkage than majority of wood timber)
- Bamboo is touted to be stronger than steel when compared tensile strength by weight.
- Anti-bacterial
- Odor resistant
- Anti-fungal
- 100 per cent biodegradable
The Properties of Bamboo

Data taken from Dr. Jim Platts research on “Wind Energy Turns to Bamboo”
How much energy does it take to produce kg of materials?

- **Wood** (from standing timber): 3-7 MJ (830 to 1,950 watt-hours).
- **Steel** (from recycled steel): 6-15 MJ (1,665 to 4,170 watt-hours).
- **Aluminum** (from 100% recycled aluminum): 11.35-17 MJ (3,150 to 4,750 watt-hours).
- **Iron** (from iron ore): 20-25 MJ (5,550 to 6,950 watt-hours).
- **Glass** (from sand, etcetera): 18-35 MJ (5,000 to 9,700 watt-hours).
- **Steel** (from iron): 20-50 MJ (5,550 to 13,900 watt-hours).
- **Paper** (from standing timber): 25-50 MJ (6,950 to 13,900 watt-hours).
- **Plastics** (from crude oil): 62-108 MJ (17,200 to 31,950 watt-hours).
- **Copper** (from sulfide ore): 60-125 MJ (16,600 to 34,700 watt-hours).
- **Aluminum** (from a typical mix of 80% virgin and 20% recycled aluminum): 219 MJ (60,800 watt-hours).
- **Silicon** (from silica): 230-235 MJ (63,900 to 65,300 watt-hours).
- **Nickel** (from ore concentrate): 230-270 MJ (63,900 to 75,000 watt-hours).
- **Aluminum** (from bauxite): 227-342 MJ (63,000 to 95,000 watt-hours).
- **Titanium** (from ore concentrate): 900-940 MJ (250,000 to 261,000 watt-hours).

Source: [Environmentally benign manufacturing](#).
How do you get to supply these high-quality building materials?
Qin Shi Huang
259 BC – 210 BC

Mao Zedong
1893 – 1976
The Two Fundamental Keys to Bamboo Building Materials

Standardization

Industrialization
The Processing and Development of Bamboo

First Generation Bamboo
The most innovative tools of the time. One tool does it all - the Billhorn machete!
Saw to sticks

Split to Sticks
First Generation Bamboo Development

Building basic building block
First Generation Bamboo Flooring

Horizontal Bamboo Flooring
Bamboo sticks are arranged horizontally side by side and stacked to thickness. This gives an appearance that is oriental look.

Vertical Bamboo Flooring
Bamboo sticks are arranged vertically side by side that form the thickness. This gives an appearance of a contemporary or modern look.
The Processing and Development of Bamboo

Natural bamboo

Carbonized bamboo
Second Generation Bamboo Development

Strand Woven Bamboo
strand Woven Bamboo Processing
Third Generation Bamboo Development

Bamboo culm is steamed, slit with an opening, unfurled to form a flat surface. As a result, you get a:

- One Piece Bamboo Face
- Unique Bamboo Cross Knuckle
- No Glue Lines on Cutting Surface
- 100% Natural Bamboo

Our patented unfurl process creates a unique, wide one piece bamboo sheet.

This is then utilized in a myriad of products further enhanced with unique styling and surface treatment.
Unfurled Bamboo as Flooring with bamboo skin
Unfurled Bamboo as Flooring without bamboo skin
Fourth Generation Bamboo Development
Transformation from Interior usage to Exterior use

Thermal Fused Technology **CLASSIC** Series
Extracted & fused to last

[Image: Before and after treatment of bamboo tissue]
Fifth Generation Bamboo Development
Transformation from dark colored product to neutral colored product.

Ceramic Fused Technology EPIC Series
Crystalized & fused to last
Are you not entertained?
Thank You